

# UTILITY PATENT APPLICATION TRANSMITTAL

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ADDRESS TO:

Assistant Commissioner for Patents  
Box Patent Application  
Washington, D.C. 20231

Attorney Docket No. 400694/YPLEE

First Named Inventor Tadao Yamaguchi

1c843 U.S. PTO  
09/587340

06/05/00

## APPLICATION ELEMENTS

1. ☒ Transmittal Form with Fee
2. ☒ Specification (including claims and abstract) [Total Pages 8]
3. ☒ Drawings [Total Sheets 5]
4. ☒ Combined Declaration and Power of Attorney [Total Pages 4]
  - a. ☒ Newly executed
  - b. ☐ Copy from prior application

[Note Box 5 below]

  - i. ☐ Deletion of Inventor(s) Signed statement attached deleting inventor(s) named in the prior application
5. ☐ Incorporation by Reference: The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Microfiche Computer Program
7. ☐ Nucleotide and/or Amino Acid Sequence Submission
  - a. ☐ Computer Readable Copy
  - b. ☐ Paper Copy
  - c. ☐ Statement verifying above copies

## ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet and document(s))
9. ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)
  - ☐ Form PTO-1449
  - ☐ Copies of References
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (Should be specifically itemized)
14. ☐ Small Entity Statement(s)
  - ☐ Enclosed
  - ☐ Statement filed in prior application; status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
16. ☐ Other:

17. If a **CONTINUING APPLICATION**, check appropriate box and supply the requisite information in (a) and (b) below:
- (a) ☐ Continuation ☐ Divisional ☐ Continuation-in-part of prior application Serial No. \_\_\_\_\_  
Prior application information: Examiner \_\_\_\_\_; Group Art Unit: \_\_\_\_\_
- (b) Preliminary Amendment: Relate Back - 35 USC §120. The Commissioner is requested to amend the specification by inserting the following sentence before the first line:  
"This is a ☐ continuation ☐ divisional of copending application(s)  
☐ Serial No. \_\_\_\_\_, filed on \_\_\_\_\_, and which designates the U.S."

## APPLICATION FEES

BASIC FEE				\$690.00
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	9 -20=	0	x \$18.00	\$
Independent Claims	1 - 3=	0	x \$78.00	\$
<input type="checkbox"/> Multiple Dependent Claims(s) if applicable			+\$260.00	\$
Total of above calculations =				\$690.00
Reduction by 50% for filing by small entity =				\$( )
<input checked="" type="checkbox"/> Assignment fee if applicable			+ \$40.00	\$40.00
TOTAL =				\$730.00

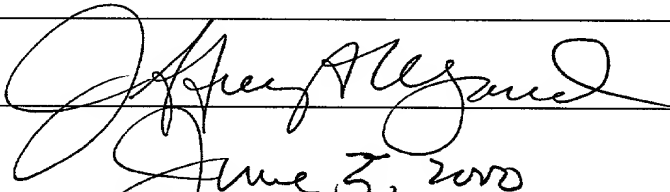
## UTILITY PATENT APPLICATION TRANSMITTAL

Attorney Docket No. 400694/YPLEE

19. ☐ Please charge my Deposit Account No. 12-1216 in the amount of \$ .
20. ☒ A check in the amount of \$730.00 is enclosed.
21. The Commissioner is hereby authorized to credit overpayments or charge any additional fees of the following types to Deposit Account No. 12-1216:
- a. ☒ Fees required under 37 CFR §1.16.
- b. ☐ Fees required under 37 CFR §1.17.
22. ☐ The Commissioner is hereby generally authorized under 37 CFR §1.136(a)(3) to treat any future reply in this or any related application filed pursuant to 37 CFR §1.53 requiring an extension of time as incorporating a request therefor, and the Commissioner is hereby specifically authorized to charge Deposit Account No. 12-1216 for any fee that may be due in connection with such a request for an extension of time.

## 23. CORRESPONDENCE ADDRESS

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Name	Jeffrey A. Wyand
Signature	
Date	June 3, 2000

UTILITY (Rev. 8/30/1999)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

YAMAGUCHI et al.

Serial No.: Unassigned

Group Art Unit: Unknown

Filed: June 5, 2000

Examiner: Unassigned

For: FLAT TYPE CORE BRUSHLESS  
MOTOR

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

IN THE TITLE:

Please change the title to --FLAT CORE BRUSHLESS MOTOR--.

IN THE SPECIFICATION:

Page 1, line 4, delete "type";

line 8, delete "type";

line 17, delete "type";

line 18, change "thin" to --thinner--;

delete "formed by being";

In re Appln. of Yamaguchi et al.

line 25, change "is formed to have" to --has--.

Page 2, line 2, delete "type".

Page 3, line 1, delete "type";

line 4, delete "type";

line 6, delete "type";

line 8, delete "type";

line 11, delete "type";

line 13, delete "formed";

line 14, delete "formed";

line 16, change "processing" to --process--;

line 20, change "large" to --enlarged--;

line 24, change "escape" to --extend--;

line 26, change "and stacking" to --of--;

after "five" insert --stacked--;

line 27, change "installed" to --located--;

line 28, change "to have" to --as having--.

Page 4, line 1, change "to" to --into--;

line 8, change "take" to --have--;

change "posture" to --profile--;

line 9, after "pressed" insert --into--;

line 10, change "at" to --in--;

In re Appln. of Yamaguchi et al.

line 12, delete "type";

line 18, change "formed" to --located--;

line 20, change "is of" to --has--;

after "a" (first occurrence) insert --rotating--;

delete "rotation type";

line 26, after "a" (first occurrence) insert --rotating--;

delete "rotation type";

line 28, after "pressed" insert --into--.

Page 5, line 2, change "embodiment" to --embodiments--;

line 5, delete "type";

line 8, change "can escape through the" to --is received in a--;

lines 8-9, change "when the concave portion for escape of the armature coil  
is installed at" to --of--;

line 10, delete "type";

line 13, delete "type";

line 15, delete "thereof";

line 16, change "shaft fixed type" to --fixed shaft--;

delete "type" (second occurrence);

line 17, change "which reduces" to --with reduced--.

In re Appln. of Yamaguchi et al.

IN THE CLAIMS:

1. (Amended) A flat [type] core brushless motor [formed by installing] including a stator [which is made by winding an] having a stator base with a plurality of protruding poles, and a respective wound armature coil wrapped around each of [a] the plurality of protruding poles [at a stator base], wherein the stator base includes [a] at least one concave portion [for escape of] receiving the armature [coil is installed at the stator base] coils.

2. (Amended) The flat [type] core brushless motor as claimed in claim 1, [wherein the concave portion for escape of the armature coil is a hole arranged at] including a circuit board attached to the stator base and including at least one hole as the concave portion.

3. (Amended) The flat [type] core brushless motor as claimed in claim 1, [wherein the concave portion for escape of the armature coil is a hole arranged at] including a circuit board attached to the stator base and [a] including at least one hole [installed at] in the circuit board and the stator base [thereunder] as the concave portion.

In re Appln. of Yamaguchi et al.

4. (Amended) The flat [type] core brushless motor as claimed in claim 2,  
[wherein the concave portion for escape of the armature coil is a hole arranged at]  
including a circuit board attached to the stator base and [a] including at least one hole  
[installed at] in the circuit board and the stator base [thereunder] as the concave portion.

5. (Amended) The flat [type] core brushless motor as claimed in claim 3, wherein  
the circuit board is [formed of] a thin flexible sheet [to cover the] covering an edge of the  
hole [formed] in the stator base.

6. (Amended) The flat [type] core brushless motor as claimed in claim 4, wherein  
the circuit board is [formed of] a thin flexible sheet [to cover the] covering an edge of the  
hole [formed] in the stator base.

7. (Amended) The flat [type] core brushless motor as claimed in claim 3,  
[wherein] including a plurality of supports[, which are lifted] bent from the stator base [by  
pressing processing, are used as a means for installing] on which the stator is installed,  
and [simultaneously a] the hole in the stator base is formed [by the press processing for  
lifting] simultaneously with the supports [is used] as part of the concave portion [for  
escape of the armature coil].

In re Appln. of Yamaguchi et al.

8. (Amended) The flat [type] core brushless motor as claimed in claim 4, [wherein] including a plurality of supports[, which are lifted] bent from the stator base [by pressing processing, are used as a means for installing] on which the stator is installed, and [simultaneously a] the hole in the stator base is formed [by the press processing for lifting] simultaneously with the supports [is used] as part of the concave portion [for escape of the armature coil].

9. (Amended) The flat [type] core brushless motor as claimed in claim [5] 7, [wherein] including a rotation support portion [is arranged] located inside the supports.

IN THE ABSTRACT:

Please replace the existing Abstract of the Disclosure with the appended Abstract of the Disclosure.



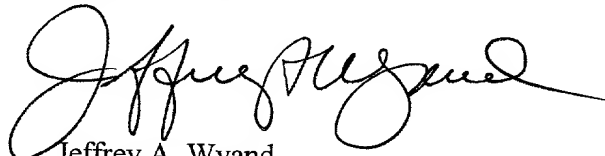
In re Appln. of Yamaguchi et al.

**REMARKS**

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

LEYDIG, VOIT & MAYER



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Date: June 5, 2000  
JAW:ves



# FLAT TYPE CORE BRUSHLESS MOTOR

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to an improvement of a flat type core brushless motor suitable for driving a spindle or a pickup used for a portable mini disk apparatus.

### 2. Description of the Related Art

A conventional flat type core brushless spindle motor used for a portable mini disk apparatus is shown in FIG. 5. That is, a brass bearing holder H is installed at a stator base B. A stator core C is formed by winding an armature coil N around a plurality of protruding poles, and is installed at the outer circumferential surface of the bearing holder H. A bearing J is installed inside the bearing holder H. A rotor R having a magnet M which is installed in a magnet holder Y facing the stator core C with a gap, is supported through a shaft S rotatably inserted in the bearing J. In the drawing, T denotes a turntable on which media is installed, which is integrally formed with the rotor R.

However, the flat type spindle motor having the above structure is restricted in being made thin by an expanded portion of the armature coil N formed by being wound around the protruding poles. Thus, the expanded portion of the armature coil is usually compressed and impregnated. Nevertheless, there is a problem of occasional disconnection or shorting of lines.

Also, when the expanded portion of the armature coil is not compressed and impregnated, the number of accumulated thickness units of a core must be reduced and thus the property of the motor is sacrificed. To solve this problem, a part of the core is formed to have an L shape. That is, a blade portion of the core is folded in an axial direction. However, this increases the manufacturing cost.

## SUMMARY OF THE INVENTION

To solve the above problems, it is an objective of the present invention to provide a flat type core brushless motor which can be made thin without compressing and reducing the expanded portion of an armature coil, to help reduce the effect of the stator base on the overall thickness of the motor, and without  
5 reducing the number of accumulated thickness units of a core, so that the properties of a motor are not sacrificed.

Accordingly, to achieve the above objective, there is provided a flat type core brushless motor formed by installing a stator which is made by winding an armature coil around each of a plurality of protruding poles at a stator base, in which a  
10 concave portion for escape of the armature coil is installed at the stator base.

It is preferred in the present invention that the concave portion for escape of the armature coil is a hole arranged at a circuit board attached to the stator base.

It is preferred in the present invention that the concave portion for escape of the armature coil is a hole arranged at a circuit board attached to the stator base and a hole installed at the stator base thereunder.

It is preferred in the present invention that the concave portion for escape of the armature coil is a hole arranged at a circuit board attached to the stator base and a hole installed at the stator base thereunder.

It is preferred in the present invention that the circuit board is formed of a thin flexible sheet to cover the edge of the hole formed in the stator base.

It is preferred in the present invention that a plurality of supports, which are lifted from the stator base by pressing processing, are used as a means for installing the stator and simultaneously a hole formed by the press processing for lifting the supports is used as part of the concave portion for escape of the armature coil.

It is preferred in the present invention that a rotation support portion is arranged inside the supports.

### BRIEF DESCRIPTION OF THE DRAWINGS

The above objective and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

FIG. 1 is a sectional view showing a flat type core brushless motor according to a first preferred embodiment of the present invention;

FIG. 2 is a perspective view showing the assembly of major parts of the flat type core brushless motor according to the first preferred embodiment of the present invention;

FIG. 3 is a sectional view showing a flat type core brushless motor according to a second preferred embodiment of the present invention;

FIG. 4 is a sectional view showing a flat type core brushless motor according to a third preferred embodiment of the present invention; and

FIG. 5 is a sectional view showing the general structure of a conventional flat type core brushless motor.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, reference numeral 1 denotes a stator base formed of a thin rolled steel plate. A circuit board 2 formed of a polyamide or polyester film is attached to the stator base 1 by a double-sided adhesive film interposed therebetween. A shaft holder 1a is formed by a clamping processing at the center of the stator base 1. Supports 1b for maintaining a stator core 3 which will be described later are formed around the shaft holder 1a by being lifted, for each of protruding poles 3a of the stator core 3. Prior to the lifting of the support 1b, as shown in FIG. 2, a slightly large hole, that is, a concave portion 1c for accommodating an expanded portion of an armature coil 3b, is provided. In this case, the circuit board 2 is cut to make a concave portion 2a having a diameter less than that of the concave portion 1c for insulation so that the expanded portion of the armature coil 3b can easily escape therethrough.

Reference numeral 3 denotes stator cores formed by winding the armature coil 3b around each of the stator cores 3 and stacking five silicon steel plates. A recess 3c supported by an end portion 1d of the support 1b is installed inside the stator core 3. Also, although the stator core 3 is described to have five stacked silicon steel plates in the preferred embodiments shown in FIGS. 1 through 4, the number of silicon steel plates of the present invention is not limited thereto.

The stator core 3 is installed at the stator base 1 by fitting the support 1b to the recess 3c. The stator core 3 is fixed by crushing a top portion 1bb of the support 1b or inserting a wedge between the end portion of the support 1b and the stator core 3. Of course, the stator core 3 can be fixed by using an adhesive. A terminal of each armature coil 3b is connected to a predetermined pattern of the circuit board 2 by soldering, thus completing a stator.

Thus, the expanded portion of each of the armature coils 3b, of which a part is accommodated in the concave portions 2a and 1c, can take a low posture. Also, in the present embodiment, the shaft 4 is fixed by being directly pressed and installed at the shaft holder 1a.

A rotor includes a bearing 5 rotatably installed at the shaft 4, a rotor case 6 installed at the bearing 5, and a ring type rubber magnet 7 which is pressed and fixedly installed inside the rotor case 6 by bending a plate to face the protruding poles 3a, .... of the stator core 3 with the gap in a radial direction. Further, the rotor case 6 is integrally formed with a turntable 8 on which a medium is installed.

A second preferred embodiment is shown in FIG. 3, which is suitable for a circuit board 22 that is relatively thick. That is, a concave portion 22a into which an expanded portion of an armature coil 3b can protrude is formed only in the circuit board 22.

In this case, the rotor R is of a shaft rotation type and a brass bearing holder 9 is installed at a stator base 11 by caulking. The rotor R includes a shaft 4 inserted in a bearing 55 installed inside a bearing holder 9, a rotor case 66 which is pressed and fixedly installed at the shaft 4, and a neodymium magnet 77 arranged inside the rotor case 66.

FIG. 4 shows a third preferred embodiment of the present invention. In the present embodiment, a shaft rotation type rotor is rotatably installed through a shaft 4 at a bearing 55 arranged inside a support 1b. The bearing 55 may be directly pressed and inserted in the support 1b or installed inside a stator core 3. Here, as the rest of the structure is the same as that of the first preferred embodiment, the same reference numerals are used for the same elements and descriptions thereof are omitted.

It is noted that the present invention is not limited to the preferred embodiment described above, and it is apparent that variations and modifications by those skilled in the art can be effected within the spirit and scope of the present invention defined in the appended claims.

5 As described above, in a flat type brushless motor according to the present invention formed by installing a stator made by winding an armature coil around each of a plurality of protruding poles at a stator base, because an expanded portion of the armature coil can escape through the concave portion when the concave portion for escape of the armature coil is installed at the stator base, there  
10 is no need to restrict the armature coil and a flat type brushless motor without problems such as disconnection or shorting of lines can be provided.

Also, the motor is suitable for a case in which the circuit board is relatively thick, while it can provide a flat type core brushless motor when an expanded portion of the armature coil is considerably large.

15 Furthermore, the brass bearing holder is not needed and the structure thereof is simplified by using a shaft fixed type motor. Thus, a flat type core brushless motor which reduces the manufacturing cost can be provided.

What is claimed is:

1           1.     A flat type core brushless motor formed by installing a stator which is  
2     made by winding an armature coil around each of a plurality of protruding poles at a  
3     stator base, wherein a concave portion for escape of the armature coil is installed at  
4     the stator base.

1           2.     The flat type core brushless motor as claimed in claim 1, wherein the  
2     concave portion for escape of the armature coil is a hole arranged at a circuit board  
3     attached to the stator base.

1           3.     The flat type core brushless motor as claimed in claim 1, wherein the  
2     concave portion for escape of the armature coil is a hole arranged at a circuit board  
3     attached to the stator base and a hole installed at the stator base thereunder.

1           4.     The flat type core brushless motor as claimed in claim 2, wherein the  
2     concave portion for escape of the armature coil is a hole arranged at a circuit board  
3     attached to the stator base and a hole installed at the stator base thereunder.

1           5.     The flat type core brushless motor as claimed in claim 3, wherein the  
2     circuit board is formed of a thin flexible sheet to cover the edge of the hole formed in  
3     the stator base.

1           6.     The flat type core brushless motor as claimed in claim 4, wherein the  
2     circuit board is formed of a thin flexible sheet to cover the edge of the hole formed in  
3     the stator base.

1           7.     The flat type core brushless motor as claimed in claim 3, wherein a  
2     plurality of supports, which are lifted from the stator base by pressing processing,  
3     are used as a means for installing the stator and simultaneously a hole formed by  
4     the press processing for lifting the supports is used as part of the concave portion  
5     for escape of the armature coil.



1           8.     The flat type core brushless motor as claimed in claim 4, wherein a  
2     plurality of supports, which are lifted from the stator base by pressing processing,  
3     are used as a means for installing the stator and simultaneously a hole formed by  
4     the press processing for lifting the supports is used as part of the concave portion  
5     for escape of the armature coil.

1           9.     The flat type core brushless motor as claimed in claim 5, wherein a  
2     rotation support portion is arranged inside the supports.

### Abstract of the Disclosure

A flat type core brushless motor is formed by installing a stator which is made by winding an armature coil around each of a plurality of protruding poles at a stator base. In the motor, a concave portion for escape of the armature coil is installed at the stator base.

FIG. 1

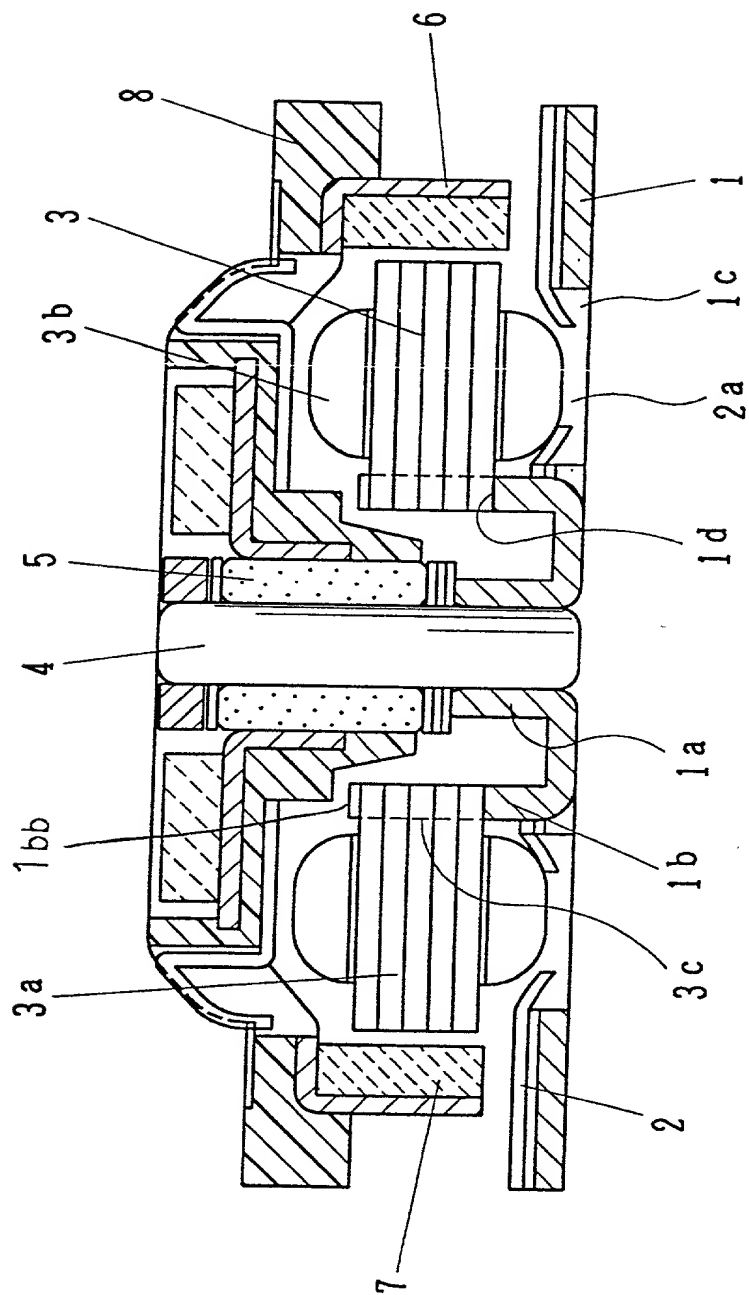


FIG. 2

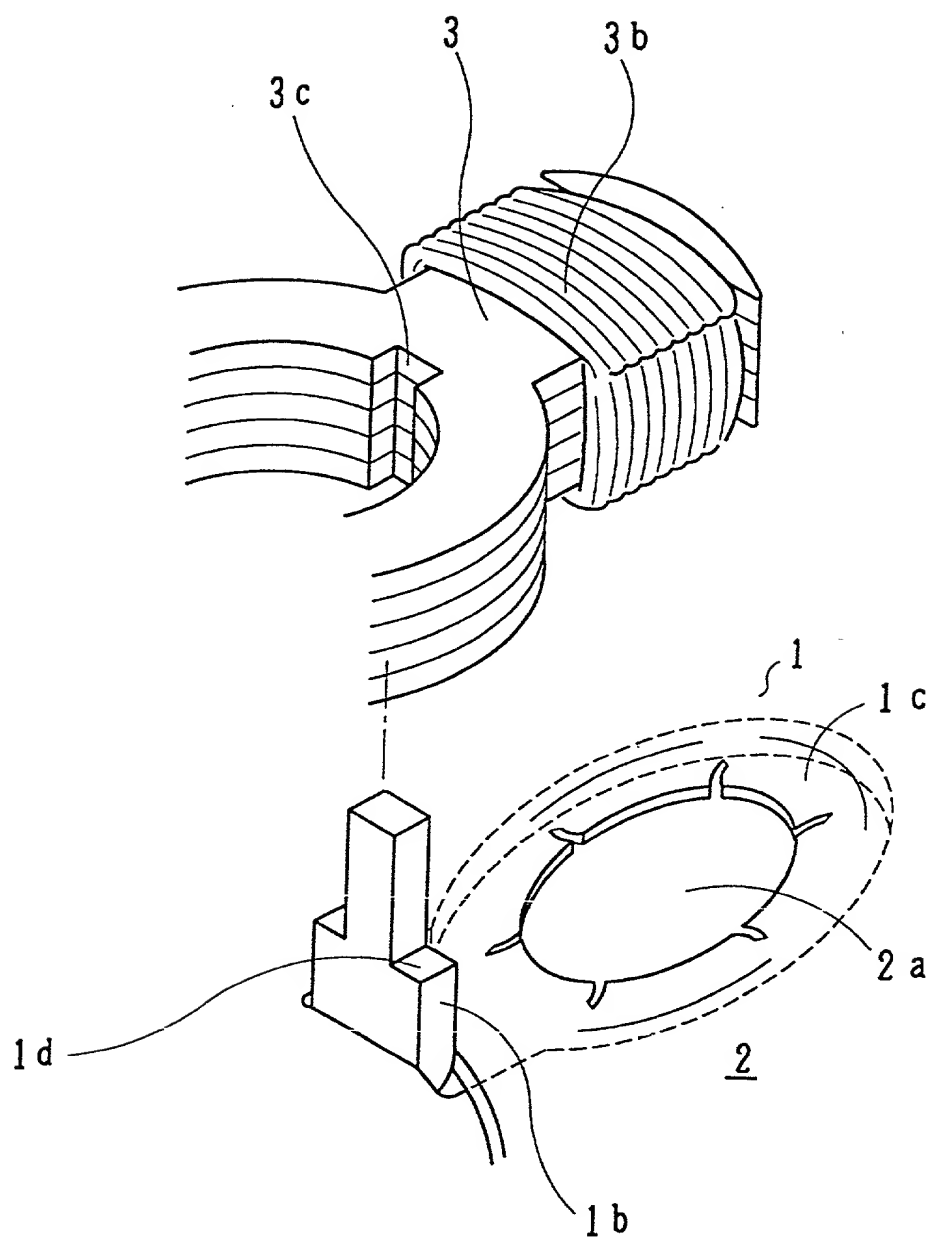




FIG. 4

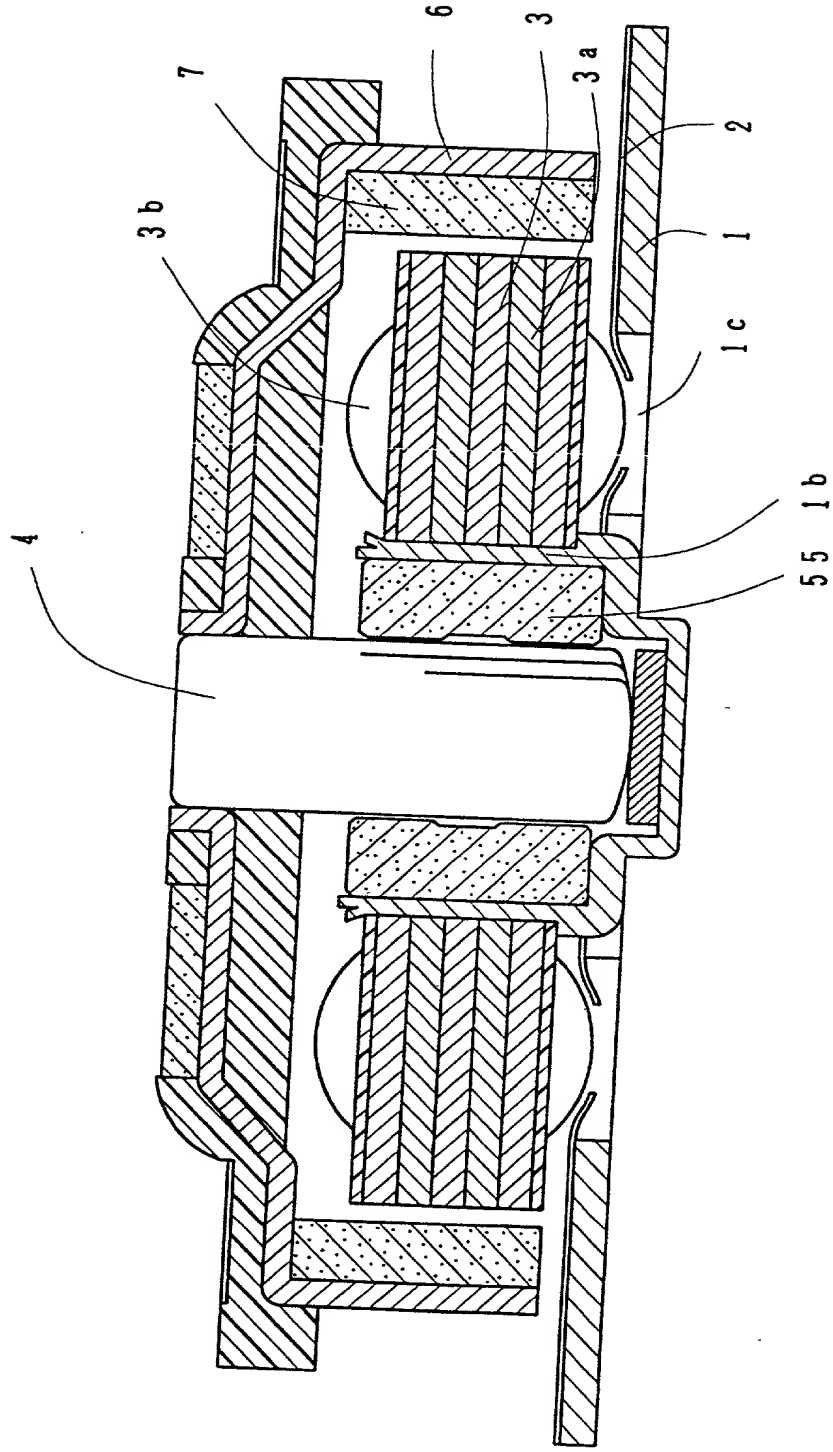
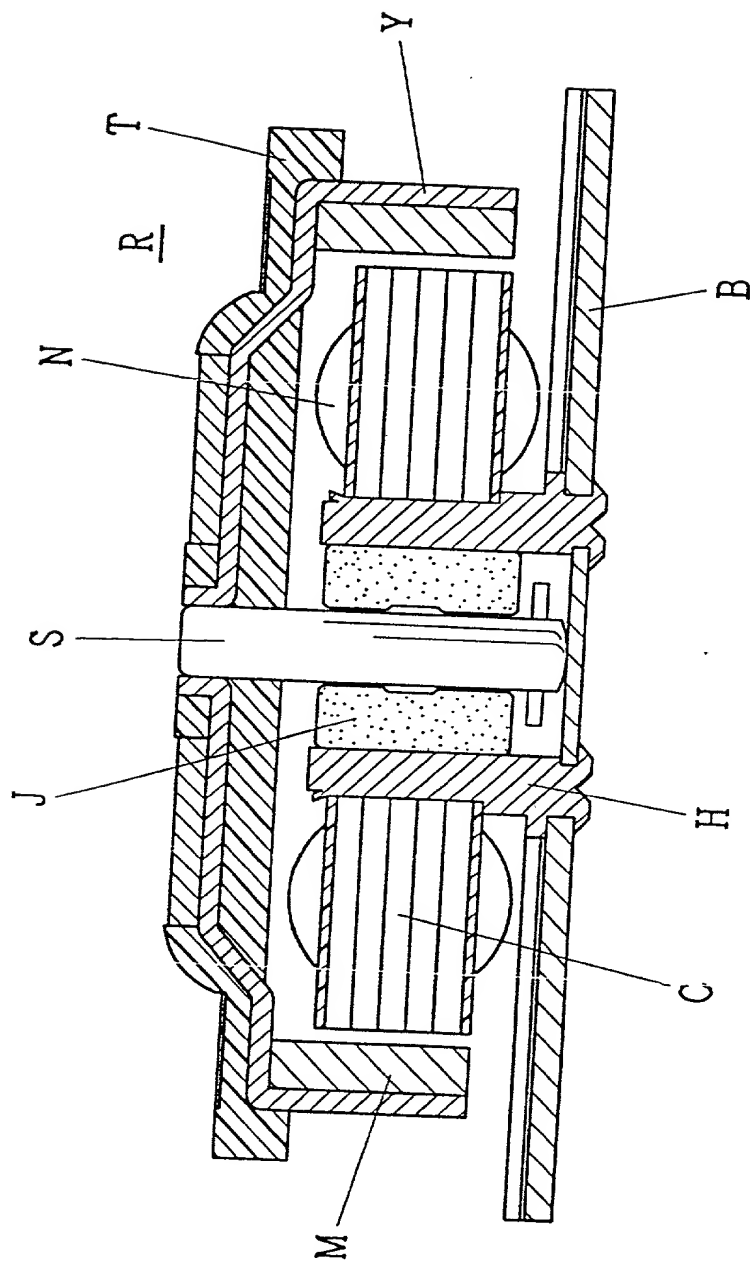


FIG. 5 (PRIOR ART)



## Patent

Attorney Docket No. \_\_\_\_\_

DECLARATION AND POWER OF ATTORNEY

This declaration is of the following type:

☒ [ V ] original            ☐ [ ] design            ☐ [ ] supplemental  
☐ [ ] national stage of PCT  
☐ [ ] divisional            ☐ [ ] continuation            ☐ [ ] continuation-in-part

As a below name inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe that I am the original, first and sole inventor (*if only one name is listed below*) or an original, first, and joint inventor (*if plural names are listed below*) of the subject matter which is claimed and for which a patent is sought on the invention entitled

FLAT TYPE CORE BRUSHLESS MOTOR

the specification of which:

[V] is attached hereto.

(Check one)

☐ [ ] was filed on \_\_\_\_\_ as Serial No. \_\_\_\_\_ and was amended on \_\_\_\_\_ (*if applicable*).

☐ [ ] was described and claimed in PCT International Application No. PCT/\_\_\_\_\_ filed on \_\_\_\_\_ and as amended pursuant to PCT Article 19 on \_\_\_\_\_ (*if any*).

I state that I have reviewed and understand the contents of the specification identified above, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to the examination of the application identified above in accordance with 37 CFR § 1.56.

I claim foreign priority benefits pursuant to 35 USC § 119(a) of any foreign application(s) for patent or inventor's certificate or of any PCT international patent application(s) designating at least one country other



than the United States of America listed below and have also identified below any foreign application(s) for patent, utility model, design registration, or inventor's certificate or any PCT international patent application(s) designating at least one country other than the United States of America filed by me for the same invention and having a filing date before that of the application(s) from which the benefit of priority is claimed.

**PRIOR FOREIGN PATENT, UTILITY MODEL, AND DESIGN REGISTRATION  
APPLICATION, BENEFIT CLAIMED UNDER 35 USC § 119(a)**

Priority Claimed  
Under 35 USC § 119(a)

Japan	9-364162	17/December/1997	Yes	___	No	V
(Country)	(Prior Foreign Application No.)	(Day/Month/Year Filed)				
Japan	9-364163	17/December/1997	Yes	___	No	V
(Country)	(Prior Foreign Application No.)	(Day/Month/Year Filed)				

I claim the benefit pursuant to 35 USC § 119(e) of the following United States Provisional patent application(s):

**PRIOR U.S. PROVISIONAL PATENT APPLICATIONS,  
BENEFIT CLAIMED UNDER 35 USC § 119(e)**

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Application No.	Filing Date (day,month,year)
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Application No.	Filing Date (day,month,year)
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I claim the benefit pursuant to 35 USC § 120 of any United States patent application(s) or PCT international patent application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this patent application is not disclosed in the prior patent application(s) in the manner provided by the first paragraph of 35 USC § 112, I acknowledge the duty to disclose material information as defined in 37 CFR § 1.56 effective between the filing date of the prior patent application(s) and the national or PCT international filing date of this patent application.

PRIOR U.S. PATENT APPLICATIONS OR PCT INTERNATIONAL PATENT  
APPLICATIONS DESIGNATING THE U.S., BENEFIT CLAIMED UNDER 35 USC § 120

U.S. PATENT APPLICATIONS

STATUS

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Application Serial No.	U.S. Filing Date	(Pat./Pend./Aban.)
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Application Serial No.	Filing Date	Status (Pat./Pend./Aban.)
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PCT APPLICATIONS DESIGNATING THE U.S.

STATUS

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Application No.	Filing Date	U.S. Serial Nos. Assigned (if any)	(Pat./Pend./Aban.)
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Application No.	Filing Date	U.S. Serial Nos. Assigned (if any)	(Pat./Pend./Aban.)
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As a named inventor, I appoint the following attorneys to prosecute this application and transact all business in the Patent and Trademark Office connected with this patent application.

John M. Belz, Reg. 30,359  
Jeffrey A. Wyand, Reg. 29,458  
Jeremy M. Jay, Reg. 33,587

Michael H. Tobias, Reg. 32,948  
Gregory A. Hunt, Reg. 41,085

Patrick R. Jewik, Reg. 40,456  
Joseph S. Ostroff, Reg. 39,321

I further direct that correspondence concerning this application be sent to:

LEYDIG, VOIT & MAYER, LTD.  
700 Thirteenth Street, N.W., Suite 300  
Washington, D.C. 20005-3960  
Telephone (202) 737-6770

I authorize my attorneys to accept and follow instructions from \_\_\_\_\_

\_\_\_\_\_ regarding any matter related to the preparation, examination, grant, and maintenance of the patent application identified

above, any continuation, continuation-in-part, or divisional patent application based on the patent application identified above, and any patent issuing from that patent application, until I or my assigns withdraw this authorization in writing.

I declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: Tadao YAMAGUCHI

Inventor's signature Tadao Yamaguchi

Date: 29 May 2000

Residence: 13-1 Yahata-cho, Iseaki-shi, Gunma-ken, 372-0051 Japan

Citizenship: Japanese

Post Office Address: Same as Residence

Full name of second joint inventor, if any: Naohisa KOYANAGI

Inventor's signature Naohisa Koyanagi

Date: 29 May 2000

Residence: 642 Miyako-machi, Iseaki-shi, Gunma-ken, 372-0801 Japan

Citizenship: Japanese

Post Office Address: Same as residence

Full name of third joint inventor, if any: Toru ARAI

Inventor's signature Toru Arai

Date: 29 May 2000

Residence: No. 204 Mezon-Miyako, 783 Miyako-machi, Iseaki-shi Gunma-ken, 372-0801 Japan

Citizenship: Japanese

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

YAMAGUCHI et al.

Serial No:           None assigned

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For:                 Flat Type Core Brushless Motor

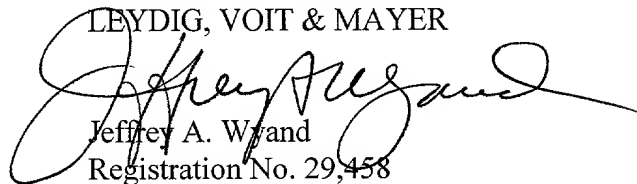
**ASSOCIATE POWER OF ATTORNEY**

Assistant Commissioner for Patents  
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Dear Sir:

I, Jeffrey A. Wyand, attorney of record in the referenced patent application, grant an  
Associate Power of Attorney to XAVIER PILLAI, Registration Number 39,799.

Respectfully submitted,

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